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## BRIEFER ARTICLES.

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### ACROSPERMUM URCEOLATUM, A NEW DISCOMYCETOUS PARASITE OF SELAGINELLA RUPESTRIS.

(WITH PLATE XXIX.)

On some material of *Selaginella rupestris* (Linn.) Spring. recently examined a small discomycetous fungus was discovered which at once aroused inquiry from its occurrence upon a plant so rare as a host.

The characteristic features of the plant show it to be an *AcrospERMUM*, but there is no record of such a fungus upon *Selaginella*, and it does not correspond to any of the described species. The material on which it was found was collected at Taylors Falls, Minnesota, in August 1896, and had been preserved in 80 per cent. alcohol for several months when it was brought into the laboratory for use and the presence of the fungus was discovered.

The family *AcrospERMACEÆ*<sup>1</sup> is of particular interest because of its intermediate position between the *Pyrenomycetes* and *Discomycetes*. In this genus especially the early stages show an intimate connection with the closed apothecia of the *Pyrenomycetes*, while the development of a broad ostiole in the mature forms indicates relationship with the open disklike ascoma of the *Discomycetes*.

Through such a transitional form the closed indehiscent perithecium of the *Erysiphe* type connects with the saucerlike *Peziza* forms, and there is some doubt whether the term "apothecium" is the correct one to use, but with this reservation it will be employed.

The apothecia studied appear upon the leaves of the host as small dark bodies, the size of a pin head, and upon examination a branch of infected material plainly shows the presence of the parasite by the dark spotted appearance of the leaves. This is due to the young apothecia on the inner side, but many of the larger ones protrude from between the leaves and can be teased out readily with a needle (*fig. 1*).

The plant is epiphyllous in its habit, and no evidence could be

<sup>1</sup> Rehm. Rabenh. Krypt. Fl. 1<sup>3</sup>: 53. 1887.

obtained of its entering deeply the tissues of the host. It is somewhat difficult to detect the mycelium, but after soaking the infected leaves in potassium hydrate for several days enough of the chlorophyll was removed to enable one to distinguish the hyphæ. A full-grown apothecium was loosened from a leaf without removing it entirely, and upon examination it showed that only the epidermis of the host, covered with the fungus mycelium, was torn away with the apothecium (*fig. 2*).

The general appearance of the young apothecia indicates that they are developed superficially by the formation of a knot of hyphæ.

The mycelium is so densely interwoven in the immediate region of the apothecia that an examination is somewhat difficult, but a few mounts were secured, showing it to consist of irregularly branching hyphæ, very small and of slightly greenish tinge, similar in color to the apothecia. The hyphæ are so dark colored that it was not easy to determine whether the mycelium is generally coenocytic or multicellular, but a few septations could be made out (*fig. 3*).

The mature apothecium is stalked, but in younger stages, previous to the development of the spores, and even earlier, when the contents of the apothecium are not yet differentiated into asci, the width is so nearly the same along the entire length that the stalk cannot be distinguished from the body. The hyphæ by which the stalk is attached to the mycelium are densely interwoven at the base, and often several apothecia are connected so that when torn away from the host they still adhere to one another by this mycelial mat (*fig. 4*), which forms, as it were, the beginnings of a stromatic cushion. The surface of the apothecium is rough and the wall is friable; it is dark olive green, the upper part being covered with a white, granular tomentum. The general outline of the apothecium is that of a vase. Dehiscence is apical, with the development of an ostiole, which does not appear till the apothecium has almost attained its growth and the asci and spores have been differentiated. The youngest apothecia observed appear as tiny dark projections on the surface of the leaf; these elongate into club shaped bodies, but as yet show no signs of an ostiole. It would seem that the apothecial wall becomes thinner at the apex as lateral growth increases, is finally ruptured and spreads outward near the top, giving the apothecium the appearance of being compressed just below the ostiole.

The size varies from 550–800 $\mu$  in length by 220–400 $\mu$  in diameter

at the widest part. The measurements for length include the stalk. In one apothecium  $800 \times 320\mu$  the stalk was  $160\mu$  long.

The number of apothecia found upon a single leaf varies from one to six or seven. When more than one are present they may be solitary or aggregated into groups, as described above. They occur on both sporophylls and foliage leaves, and always on the upper side. When found on the sporophylls they are grouped about the sporangium of the host, but in none of the material examined were apothecia seen growing upon the sporangium itself (*fig. 5*).

The asci are numerous, a hundred or more in each apothecium. By soaking some material in potassium hydrate for several days the apothecial wall becomes sufficiently cleared to reveal the arrangement of the asci within. They lie parallel in the body of the apothecium, closely crowded together and extending almost to the ostiole (*fig. 6*). When the asci are released through the side by breaking open the apothecium they escape in masses, clinging together, with numerous paraphyses. These are about a third or a fourth the length of the asci, delicate, threadlike, hyaline. The asci vary from  $220-320\mu$  long by  $5-8\mu$  wide. One ascus showed a curious branching near the end (*fig. 7*).

The spores are long and slender, extending the entire length of the ascus, but the whole group of spores is generally so twisted that it is extremely difficult to determine their number, as it is almost impossible to remove them from the ascus without entirely crushing them (*fig. 8*). In one such attempt the broken ends of at least six spores could be distinguished (*fig. 9*).

Another method employed was to embed the apothecia in paraffin, and with the microtome cut a series of transverse sections, thus obtaining cross sections of the asci. Two of these sections revealed seven spores in the one case and nine in the other (*fig. 10*).

The spores are multiseptate and hyaline, so that when they are twisted the septations of the under ones can be seen through the upper ones, giving them a guttate appearance.

After careful study of descriptions and comparison with herbarium material, the habit of growth, character of the apothecium, ascus, and spores, clearly place the plant studied in the genus *Acrospermum* Tode, of which the following description is translated from Saccardo<sup>2</sup>, who places these plants in the Hysteriaceæ among the Pyrenomycetes, with

<sup>2</sup> SACCARDO, Syll. Fung. 2: 8c7. 1883.

which, as with the Hypocreaceæ<sup>3</sup>, they have at different times been classified :

“Perithecia vertical, elongated or clavate, sessile or stalked, leathery. Asci filiform, eight-spored. Spores crowded together, parallel, filiform.”

So far as could be determined there have been only sixteen species described, of which three are doubtful. The following eight are recorded from America :

ACROSPERMUM COMPRESSUM Tode Fung. Meckl. 1: 8. *pl.* 2. *f.* 13. 1790. On Cucurbitaceæ, Pisum, *Urtica dioica*, and Umbelliferæ; also on various grasses and leaves of Olea.

ACROSPERMUM GRAMINUM Lib. Exs. Ard. n. 33. Corda. Ic. Fung. 3: 27. *f.* 73. 1839. On Poa, Festuca, Calamagrostis, Triticum, etc.

ACROSPERMUM RAVENELII B. & C. Grev. 4: 161. 1876. On Cercis, Vitis, and Fraxinus.

ACROSPERMUM FOLIICOLUM Berk. Grev. 4: 161. 1876. On Ulmus and Celtis, Vitis, and Smilax.

ACROSPERMUM VIRIDULUM B. & C. Grev. 4: 161. 1876. On stems of dead shrubs and herbs, and on leaves of *Pyrus communis*, Hicoria and Quercus.

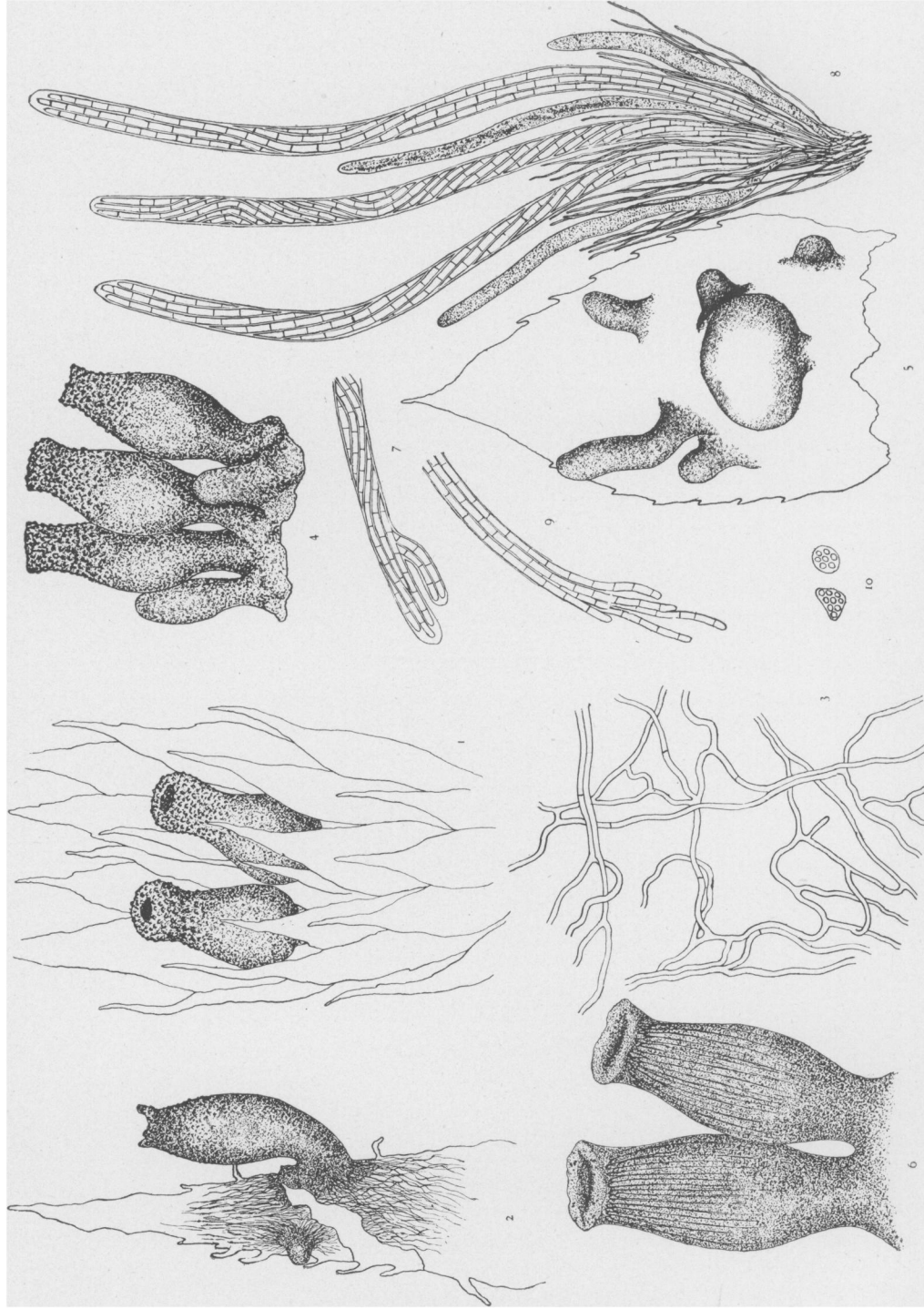
ACROSPERMUM CORRUGATUM Ell. Bull. Torr. Bot. Club. 8: 124. 1881. On decayed wood and Umbellularia.

ACROSPERMUM FULTUM Harkn. New Calif. Fungi 26. —. On Eucalyptus.

ACROSPERMUM ALBUM Peck. 32d Rep. N. Y. Mus. Nat. Hist. 38. 1879. On *Aralia racemosa*.

The herbarium material studied for comparison includes the following species: ACROSPERMUM COMPRESSUM Tode (Ellis, *North Amer. Fungi*, no. 1318, on *Cinna arundinacea*; C. Rouméguère, *Fungi Gallici exsiccati*, no. 1851, on *Urtica dioica*; Krieger, *Fungi Saxonici*, no. 438, on *Lunaria rediviva*), ACROSPERMUM CONICUM Fries (*Reliquiæ Mougeotianæ*, no. 24, on *Sonchus alpinus*); ACROSPERMUM CORRUGATUM ELL. (Ellis and Everhart, *North Amer. Fungi*, no. 2055, on *Umbellularia Californica*); ACROSPERMUM FOLIICOLUM B. and C. (Ellis and Everhart, *North Amer. Fungi*, no. 2629, on leaves of Ulmus; no. 2149, on Concord grape); ACROSPERMUM GRAMINUM Lib. (Sydow *Mycotheca Marchica* no. 1957, on *Triticum viridulum*); ACROSPERMUM VIRIDULUM B. and C. (Ellis, *North Amer. Fungi*, no. 857, on *Pyrus communis*).

<sup>3</sup>ELLIS and EVERHART, *North Amer. Pyrenomycetes* 58. 1892.



ACROSPERMUM URCEOLATUM OLSON, n. sp.

The two species which the plant under consideration most nearly resembles are *Acrospermum viridulum* B. and C. (but the apothecia, asci, and spores of the new plant are too large to justify its classification here) and *Acrospermum fultum* Harkn. (but the shape of the apothecium and measurements of the paraphyses exclude it from this species).

***Acrospermum urceolatum***, n. sp. — Apothecia solitary or aggregated into small groups, elongated vertically, stalked when mature, with distinct ostiole, below somewhat compressed, giving a vaselike appearance; young apothecia approximately hemispherical, lengthening and becoming club shaped before the appearance of the ostiole, dark olive green, upper part covered with white granular tomentum,  $550-800\mu$  in length by  $220-400\mu$  in diameter at the widest part; asci many, elongated and cylindrical, tapering at the lower end, crowded closely together, of nearly the same length as the body of the perithecium,  $220-350\mu \times 5-8\mu$ , accompanied by delicate threadlike unseptate paraphyses  $1.3\mu$  in diameter and one-third to one-fourth the length of the asci; spores hyaline, filiform, very slender,  $1.6\mu$  in diameter, of the same length as the ascus, multiseptate, generally curved, rarely lying straight throughout the length of the ascus.

On leaves of *Selaginella rupestris* (Linn.) Spring. Taylors Falls, Minnesota. Coll. Conway MacMillan. August 1896.—MARY E. OLSON, *University of Minnesota*.

#### EXPLANATION OF PLATE XXIX.

FIG. 1. Appearance of mature apothecia on a branch of the host, showing ostiole and granular tomentum (dry).  $\times 38$ .

FIG. 2. Mature and rudimentary apothecia attached to the host by dense mycelial weft (water mount).  $\times 54$ .

FIG. 3. Mycelium.  $\times 334$ .

FIG. 4. Group of apothecia connected by mycelial mat.  $\times 38$ .

FIG. 5. Young apothecia growing on a sporophyll, grouped about the sporangium of the host.  $\times 38$ .

FIG. 6. Mature apothecia soaked in KOH, showing arrangement of the asci.  $\times 134$ .

FIG. 7. Branched ascus.  $\times 334$ .

FIG. 8. Three mature and three young asci, with paraphyses, spores curved within the asci.  $\times 334$ .

FIG. 9. Ascus broken, showing the ends of six spores.  $\times 334$ .

FIG. 10. Cross sections of asci, showing the number of spores.  $\times 334$ .